Unit 7, Lesson 16

Graphing from the Vertex Form

Let's use vertex form to reason about a graph.

16.1 Math Talk: When x Is -7

Evaluate each expression when x is -7, mentally.

- $x + 4$
- $(x + 4)^2$
- $-(x + 4)^2$
- $-(x + 4)^2 + 5$

16.2 Four Functions

1. Complete the table of values for each function.
   $f(x) = (x - 4)^2$

x	0	1	2	3	4	5	6	7
$f(x)$								

$g(x) = -(x - 4)^2$

x	0	1	2	3	4	5	6	7
$g(x)$								

2. Use the completed tables to answer these questions:
   a. What are the coordinates of the vertex of each graph? How can you tell?

   b. Does the graph of function f open up or down? How can you tell?

   c. Does the graph of function g open up or down? How can you tell?

3. Suppose function h is defined by $h(x) = (x - 4)^2 + 5$ and function j is defined by $j(x) = -(x - 4)^2 + 5$. Make predictions about the graph of each function using the questions here. If you get stuck, try creating tables of values.
   a. What are the coordinates of the vertex of the graphs of h and j?

   b. Which way—up or down—does the graph of each function open? How do you know?

16.3 Four More Functions

Here are some tables of values that represent quadratic functions.

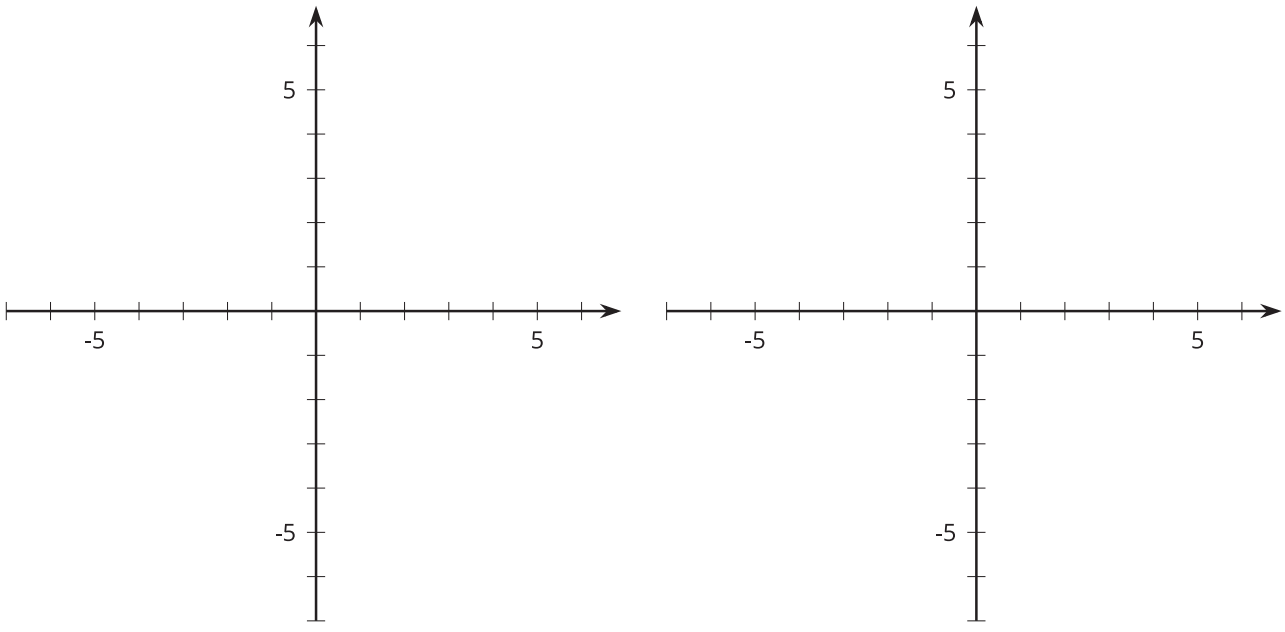
x	2	3	4	5	6	7	8
$t(x)$	-11	-2	1	-2	-11	-26	-47

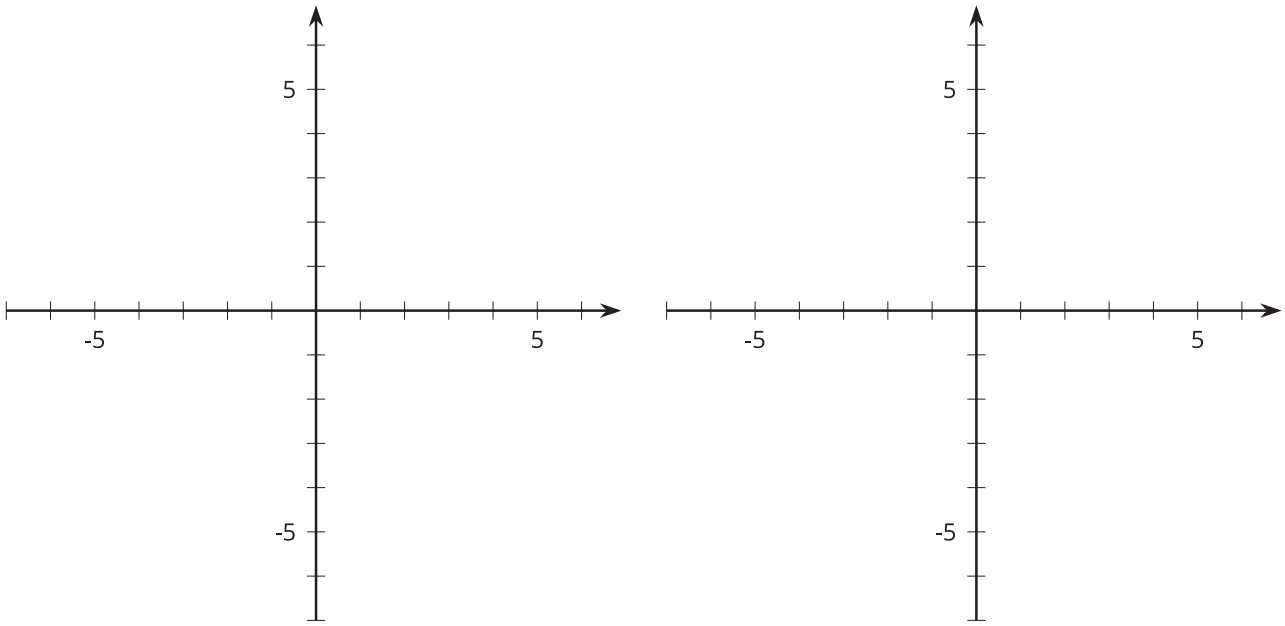
x	-2	-1	0	1	2	3	4
$u(x)$	13	4	1	4	13	28	49

x	-1	0	1	2	3	4	5
$v(x)$	76	49	28	13	4	1	4

x	-4	-3	-2	-1	0	1	2
$w(x)$	-47	-26	-11	-2	1	-2	-11

1. Make a rough sketch of a graph of each function. Label the vertex of each graph with its coordinates.





2. Here are some expressions that define quadratic functions. Match each function t, u, v, and w with an expression that defines it.
   a. $3x^2 + 1$
   b. $-3(x - 4)^2 + 1$
   c. $3(x - 4)^2 + 1$
   d. $-3x^2 + 1$